

Abstract:

A process for the fabrication of a metallic component, such as those used in energy generation and heat transfer systems (e.g., reactor vessels, combustion chambers), in propulsion systems (e.g., rocket engines), and communications (e.g., optical telescopes). The process comprises: providing an object (e.g. a shaped mandrel) having surface; performing a first electroforming operation, thereby forming a first metallic layer comprising a metallic material (e.g. nickel, copper) on said surface; forming a first mask layer on the first metallic layer, the first mask layer comprising a non-conductive material (e.g. PMMA); patterning the first mask layer, thereby providing a plurality of first recesses in the first mask layer in which the non-conductive material above the first metallic layer is removed, said first recesses having a dimension of elongation; performing second electroforming operation using a metallic material whereby said first recesses are filled with said metallic material and a second metallic layer is formed comprising said metallic material extending at least a first predetermined thickness above, and entirely or partially over the surface of, said first mask layer. The process may include: forming a second mask layer on the upper surface of the second metallic layer, the second mask layer comprising a non-conductive material; patterning the second mask layer, thereby providing a plurality of second recesses in the second mask layer in which the non-conductive material above the second metallic layer is removed, said second recesses having a dimension of elongation; performing a third electroforming operation using said metallic material whereby said second recesses are filled with said metallic material and a third metallic layer is formed comprising said metallic material extending at least a second predetermined thickness above, and entirely or partially over the surface of, said mask layer. The non-conductive material and mandrel are removed, thus producing a component single or multiple layers of cooling or heat transfer channels, the channels in adjacent layers for example having directions at right angles.

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